

**STATEMENT OF BASIS ADDENDUM**  
**LA0120677, AI 127497**

1. **The Applicant Is:** Magnolia Plantation Water System  
Magnolia Plantation Water Treatment Plant  
Post Office Box 960  
Abbeville, Louisiana 70511
2. **Facility Type:** water treatment plant
3. **Application Received:** March 4, 2005
4. **Prepared By:** Molly Hebert
5. **Date Prepared:** July 28, 2005
6. **Permit Type:** Issuance of LPDES permit LA0120677  
LPDES Draft permit issued: May 17, 2005
7. **Changes to Statement of Basis :**

A. Part 2.A. Facility Information

Lab data submitted by Magnolia Plantation on June 14, 2005 indicate a maximum chloride concentration of 8350 ppm and an average chloride concentration of 4765 ppm in the discharge.

B. Part 6.B. Compliance History/Comments

- a. May 6, 2005 –A complaint was received regarding high chloride concentrations in Tigre Coulee. A property owner along an adjacent branch of the tributary system for Bayou Tigre was concerned about chlorides being discharged from the plant. The owner is using water from the Bayou Tigre watershed to irrigate rice. The owner was informed of the draft permit and asked to submit official comments to the Agency. On May 12, 2005, an inspection was conducted by surveillance. Four samples were taken downstream from the facility (one from the discharge and one from the irrigation pump). These samples showed chloride levels ranging from 280 ppm to 1340 ppm downstream from the facility
- b. A follow up site visit was conducted on July 21, 2005 by Permits, Surveillance, and Engineering staff. Surface and depth samples were collected from 5 sites along the Bayou Tigre tributary system (see attached site visit report).

C. Rationale for Outfall 001.

Changes from those proposed in the Draft Permit of May 17, 2005 for the chloride limits on this Outfall are proposed due to new information regarding the condition and existing use of the receiving stream. Letters received during the comment period from the general public indicate that Agriculture is an existing use of the Bayou Tigre watershed. Per LAC 33.IX.1109.A, LDEQ must protect all existing uses of a receiving stream.

While LAC 33.IX.1123 does not include an in-stream chloride standard for this Subsegment, LDEQ has the authority to assign an appropriate standard. LAC 33.IX.1113.C.2 states in regards to chlorides, sulfates, and total dissolved solids, that for Subsegments "...that have no

listed criteria (ie, designated N/A), criteria will be established on a case-by-case basis using field determination of ambient conditions and the designated uses."

LDEQ has been made aware (through the public comment period) of 2 crops, rice and crawfish, that are cultivated in this drainage system. The upper watershed, while generally at low flow conditions, is used for irrigation following rain events. The salinity tolerance for rice is 600 ppm per the LSU AgCenter General Guide to Using Salt Water on Rice. This concentration is tolerable at all stages of rice growth. The salinity tolerance for crawfish is 1200 ppm per the LSU AgCenter Crawfish Production Manual. Levels above 1200 ppm will begin to affect spawning. **Therefore, in order to protect the existing Agricultural use of the receiving stream, the in-stream standard used to calculate the chloride limits for this facility has been set at 600 ppm.**

Current in-stream chloride concentrations have not been considered in these calculations per the Implementation Plan. In addition, this facility is located at the headwaters of the Bayou Tigre Watershed. As such there is no upstream chloride concentration. Background chloride levels are assumed to be zero. A reopener clause has also been included in this permit to allow adjustment if necessary based on future Total Maximum Daily Loads (TMDLs), Waste Load Allocations (WLAs), and/or revisions to the standard.

The Louisiana Surface Water Quality Standards Implementation Plan (version 4, September 27, 2001) states that "in cases where the critical flow is less than or equal to 0.1 cfs, 0.1 cfs shall be the default critical flow for streams not designated intermittent." In addition, the Implementation Plan states that for cases where the "harmonic mean flow is less than or equal to 1 cfs, 1 cfs shall be the default harmonic mean flow for streams not designated intermittent." The water quality calculations in the May 17, 2005 Draft Permit used a critical flow of 0 cfs and a harmonic mean of 1 cfs.

Data and visual evaluation of the receiving stream obtained by LDEQ permitting and field staff have established that this is not an accurate representation of the in-stream conditions. This facility is located at the headwaters of the watershed. As such, the receiving stream does not always have a flow and does not have long-term mixing potential. Per LAC33.IX.1115.7.c, "...specified flows will not be appropriate under some circumstances.....The Department may approve an alternative which is protective of designated uses, to be determined on a case-by-case basis." The harmonic mean value of 1 cfs is inappropriate for the conditions present in the receiving stream and shall not be included in the mixing zone calculations as described in LAC 33.IX.1115.C.8. Therefore, it has been set to 0 cfs in the new limitation calculations. LDEQ has concluded that the facility discharge will experience some mixing during rainfall events. As such, the Critical Flow value has been set to 0.1 cfs.

Finally, because these chloride limits are water quality based, a 3 year compliance schedule will be allowed per LAC 33. IX.1109.D.1. As this facility has been discharging to the watershed for approximately 10 years and per comment letters received by the Agency, farmers in this area do periodically experience high salinity levels due to natural conditions (intrusion), it is felt that "Report" requirements for this interim period are appropriate until plant upgrades are complete. Rice farmers in this area do have ground water pumps as an alternative to surface water irrigation.

Rationale for Magnolia Plantation Water Treatment Plant

***Interim Limits – Permit Effective Date to 3 years after Effective Date***

1. **Outfall 001 – filter backwash and floor rinse water (Flow = 0.0648 MGD)**

<u>Pollutant</u>	<u>Limitation</u> Mo. Avg:Daily Max	<u>Reference</u>
Flow (GPD)	Report : Report	(*1)
TSS	30 : 45 mg/l	(*2), BPJ
Clarifying Agents Used	Report : Report	(*2), BPJ
Total Recoverable Iron	--- : Report	(*2), BPJ
<b>Chlorides</b>	<b>Report: Report</b>	<b>(*3)</b>
pH	6.0 su min. - 9.0 su max	(*2), BPJ

**Treatment:** Settling/Dilution Tank

**\*\*Monitoring Frequency:** Monthly for Flow, TSS, Clarifying Agent, Chlorides, and pH parameters  
Quarterly for Total Recoverable Iron

**\*\*Limits Justification:**

Flow: Reporting of flow is required by LAC 33:IX.2361.I.1.b

TSS, Clarifying Agents, Total Recoverable Iron, pH: The limits for these parameters are based on the limits presented in Schedule B of the Potable Water Treatment Plant general permit. The Total Recoverable Iron monitoring requirement has been included because the facility is chlorinating to oxidize iron so that it can be removed in the Mn greensand filters. This iron may be leaving the facility in the discharge of filter backwash water.

Chlorides: Monitoring and reporting requirements have been included for the interim period based on LAC 33:IX.1109.D.1. Chloride limitations have not been included as per similar LPDES permit interim schedules for minor facilities. A progress report outlining the status of the facility improvements shall be submitted on a yearly basis until compliance is achieved.

(\*1) LAC 33:IX.2361.I.1.b

(\*2) Potable Water Treatment Plant General Permit, Issued January 1, 2005

(\*3) Interim limits reporting schedule implemented per LAC 33:IX.1109.D.1 and per similar LPDES permit interim schedules for minor facilities.

BPJ Best Professional Judgment

GPD Gallons per Day

su Standard Units

Rationale for Magnolia Plantation Water Treatment Plant

***Final Limits – 3 years after Effective Date to Permit Expiration Date***

1. **Outfall 001 – filter backwash and floor rinse water (Flow = 0.0648 MGD)**

<u>Pollutant</u>	<u>Limitation</u> Mo. Avg:Daily Max	<u>Reference</u>
Flow (GPD)	Report : Report	(*1)
TSS	30 : 45 mg/l	(*2), BPJ
Clarifying Agents Used	Report : Report	(*2), BPJ
Total Recoverable Iron	--- : Report	(*2), BPJ
<b>Chlorides</b>	<b>832 : 1975 mg/l</b>	<b>(*3), BPJ</b>
pH	6.0 su min. - 9.0 su max	(*2), BPJ

**Treatment:** Settling/Dilution Tank

**\*\*Monitoring Frequency:** Monthly for Flow, TSS, Clarifying Agent, Chlorides, and pH parameters  
Quarterly for Total Recoverable Iron

**\*\*Limits Justification:**

Flow: Reporting of flow is required by LAC 33:IX.2361.I.1.b

TSS, Clarifying Agents, Total Recoverable Iron, pH: The limits for these parameters are based on the limits presented in Schedule B of the Potable Water Treatment Plant general permit. The Total Recoverable Iron monitoring requirement has been included because the facility is chlorinating to oxidize iron so that it can be removed in the manganese green-sand filters. This iron may be leaving the facility in the discharge of filter backwash water.

Chlorides: Please note the rationale presented above in section 7.C of this Addendum and the water quality screen in Appendix A-1

(\*1) LAC 33:IX.2361.I.1.b

(\*2) Potable Water Treatment Plant General Permit, Issued January 1, 2005

(\*3) Appendix A-1, Water Quality Screen

BPJ Best Professional Judgment

GPD Gallons per Day

su Standard Units

Water Quality Screen for

Input variables:

Receiving Water Characteristics:

Receiving Water Name= Tigre Coulee

Critical flow (Qr) cfs= 0.1

Harm. mean/avg tidal cfs= 0

Drinking Water=1 HHNPCR=2 1

Marine, 1=y, 0=n

Rec. Water Hardness= 82

Rec. Water TSS= 70

Fisch/Specific=1,Stream=0

Diffuser Ratio=

Effluent Characteristics:

Permittee= Magnolia Plantation Water System

Permit Number= LA0120677, A1127497

Facility flow (Qef),MGD= 0.0648

Outfall Number = 001

Eff. data, 2=lbs/day 1

MQL, 2=lbs/day 1

Effluent Hardness= N/A

Effluent TSS= N/A

WQBL ind. 0=y, 1=n

Acute/Chr. ratio 0=n, 1=y 0

Aquatic,acute only=1=y,0=n

Page Numbering/Labeling

Appendix Appendix A-1

Page Numbers 1=y, 0=n 1

Input Page # 1=y, 0=n 1

Fischer/Site Specific inputs:

Pipe=1,Canal=2,Specific=3

Pipe width, feet

ZID plume dist., feet

MZ plume dist., feet

HHnc plume dist., feet

HHc plume dist., feet

Fischer/site specific dilutions:

Dilution = ---

F/specific MZ Dilution = ---

F/specific HHnc Dilution= ---

F/specific HHc Dilution= ---

Dilution:

ZID Fs = 0.1

MZ Fs = 1

Critical Qr (MGD)= 0.06463

Harm. Mean (MGD)= 0.06463

ZID Dilution = 0.9093078

MZ Dilution = 0.5006567

HHnc Dilution= 0.5006567

HHc Dilution= 0.5006567

ZID Upstream = 0.0997377

MZ Upstream = 0.9973765

MZhhnc Upstream= 0.9973765

MZhhc Upstream= 0.9973765

ZID Hardness= ---

MZ Hardness= ---

ZID TSS= ---

MZ TSS= ---

Multipliers:

WLAA --> LTAA 0.32

WLAC --> LTAC 0.53

LTA a,c-->WQBL avg 1.31

LTA a,c-->WQBL max 3.11

LTA h --> WQBL max 2.38

WQBL-limit/report 2.13

WLA Fraction 1

WQBL Fraction 1

Conversions:

ug/L-->lbs/day Qef 0.0005404

ug/L-->lbs/day Qeo 0

ug/L-->lbs/day Qr 0.000834

lbs/day-->ug/L Qeo 1850.3716

lbs/day-->ug/L Qef 1850.3716

diss-->tot 1=y0=n 1

Cu diss-->tot1=y0=n 1

cfs-->MGD 0.6463

Receiving Stream:

Default Hardness= 25

Default TSS= 10

99 Crit., 1=y, 0=n 1

Toxicity Dilution Series:

Biomonitoring dilution: 0.5006567

Dilution Series Factor: 0.75

Percent Effluent

Dilution No. 1 66.754%

Dilution No. 2 50.0657%

Dilution No. 3 37.5493%

Dilution No. 4 28.1619%

Dilution No. 5 21.1215%

Partition Coefficients; Dissolved-->Total

METALS

FW

Total Arsenic 2.5115333

Total Cadmium 3.3024873

Chromium III 5.5237244

Chromium VI 1

Total Copper 4.1387652

Total Lead 7.5490399

Total Mercury 2.5998684

Total Nickel 4.0450066

Total Zinc 5.4713578

Aquatic Life, Dissolved

Metal Criteria, ug/L

METALS

ACUTE CHRONIC

Arsenic 339.8 150

Cadmium 25.649088 0.8903321

Chromium III 466.42162 151.30235

Chromium VI 15.712 10.582

Copper 15.28373 10.367953

Lead 51.997873 2.0262825

Mercury 1.734 0.012

Nickel 1196.6515 132.89774

Zinc 96.734258 88.333047

Site Specific Multiplier Values:

CV = ---

N = ---

WLAA --> LTAA ---

WLAC --> LTAC ---

LTA a,c-->WQBL avg ---

LTA a,c-->WQBL max ---

LTA h --> WQBL max ---

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(*1)	(*2)	(*3)	(*4)	(*5)	(*6)	(*7)	(*8)	(*9)	(*10)	(*11)
Toxic	Cu Effluent	Effluent		MQL Effluent	95th %		Numerical Criteria			HH
Parameters	Instream	/Tech	/Tech	1=No 95%	estimate		Acute	Chronic	HHDW	Carcinogen
	Conc.	(Avg)	(Max)	0=95 %	Non-Tech		FW	FW		Indicator
	ug/L	ug/L	ug/L	ug/L	ug/L		ug/L	ug/L	ug/L	*C*
NONCONVENTIONAL										
Total Phenols (4AAP)				5			700	350	5	
3-Chlorophenol				10					0.1	
4-Chlorophenol				10			383	192	0.1	
2,3-Dichlorophenol				10					0.04	
2,5-Dichlorophenol				10					0.5	
2,6-Dichlorophenol				10					0.2	
3,4-Dichlorophenol				10					0.3	
2,4-Dichlorophenoc-										
acetic acid (2,4-D)				---					100	
2-(2,4,5-Trichlorophen-										
oxy) propionic acid										
(2,4,5-TP, Silvex)				---					10	
METALS AND CYANIDE										
Total Arsenic				10			643.51386	284.07027	94.690091	
Total Cadmium				1			28.023886	1.4644384	39.65241	
Chromium III				10			872.32331	282.97266	247.38279	
Chromium VI				10			15.712	10.582	50	C
Total Copper				10			14.435929	10.868022	2892.4889	
Total Lead				5			75.487104	2.9416241	271.88505	
Total Mercury				0.2			5.3768987	0.0372104	6.2017286	
Total Nickel				40			1015.8076	112.81358		
Total Zinc				20			123.54153	112.81215	17470.389	
Total Cyanide				20			45.9	5.2	663.8	
DIOXIN										
2,3,7,8 TCDD; dioxin				1.0E-05					7.1E-07	C
VOLATILE COMPOUNDS										
Benzene				10			2249	1125	1.1	C
Bromoform				10			2930	1465	3.9	C
Bromodichloromethane				10					0.2	C
Carbon Tetrachloride				10			2730	1365	0.22	C
Chloroform				10			2890	1445	5.3	C
Dibromochloromethane				10					0.39	C
1,2-Dichloroethane				10			11800	5900	0.36	C
1,1-Dichloroethylene				10			1160	580	0.05	C
1,3-Dichloropropylene				10			606	303	9.86	
Ethylbenzene				10			3200	1600	2390	
Methyl Chloride				50			55000	27500		
Methylene Chloride				20			19300	9650	4.4	C
1,1,2,2-Tetrachloro-										
ethane				10			932	466	0.16	C

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(*1)	(*12)	(*13)	(*14)	(*15)	(*16)	(*17)	(*18)	(*19)	(*20)	(*21)	(*22)	(*23)
Toxic	WLAa	WLAc	WLAh	LTaa	LTAc	LTAh	Limiting	WQBL	WQBL	WQBL	WQBL	Need
Parameters	Acute	Chronic	HHDW	Acute	Chronic	HHDW	A,C,RH	Avg	Max	Avg	Max	WQBL?
	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	ug/L	lbs/day	lbs/day	
NONCONVENTIONAL												
Total Phenols (4AAP)	769.81636	699.08179	9.9868827	246.34123	370.51335	9.9868827	9.9868827	9.9868827	23.768781	0.0053972	0.0128454	no
3-Chlorophenol	---	---	0.1997377	---	---	0.1997377	0.1997377	0.1997377	0.4753756	0.0001079	0.0002569	no
4-Chlorophenol	421.19952	383.4963	0.1997377	134.78385	203.25304	0.1997377	0.1997377	0.1997377	0.4753756	0.0001079	0.0002569	no
2,3-Dichlorophenol	---	---	0.0798951	---	---	0.0798951	0.0798951	0.0798951	0.1901502	4.318E-05	0.0001028	no
2,5-Dichlorophenol	---	---	0.9986883	---	---	0.9986883	0.9986883	0.9986883	2.3768781	0.0005397	0.0012845	no
2,6-Dichlorophenol	---	---	0.3994753	---	---	0.3994753	0.3994753	0.3994753	0.9507512	0.0002159	0.0005138	no
3,4-Dichlorophenol	---	---	0.599213	---	---	0.599213	0.599213	0.599213	1.4261269	0.0003238	0.0007707	no
2,4-Dichlorophenoxy- acetic acid (2,4-D)	---	---	199.73765	---	---	199.73765	199.73765	199.73765	475.37562	0.1079446	0.2569082	no
2-(2,4,5-Trichlorophenoxy) propionic acid (2,4,5-TP, Silvex)	---	---	19.973765	---	---	19.973765	19.973765	19.973765	47.537562	0.0107945	0.0256908	no
METALS AND CYANIDE												
Total Arsenic	707.69642	567.3953	189.13177	226.46286	300.71951	189.13177	189.13177	189.13177	450.13361	0.1022129	0.2432666	no
Total Cadmium	30.818923	2.9250349	79.200793	9.8620554	1.5502685	79.200793	1.5502685	2.0308518	4.8213351	0.0010975	0.0026056	no
Chromium III	959.32679	565.20296	494.11658	306.98457	299.55757	494.11658	299.55757	392.42041	931.62404	0.2120765	0.5034794	no
Chromium VI	17.279078	21.136239	99.868827	5.529305	11.202206	99.868827	5.529305	7.2433895	17.196138	0.0039146	0.0092933	no
Total Copper	15.875734	21.707533	5777.3895	5.080235	11.504992	5777.3895	5.080235	6.6551078	15.799531	0.0035966	0.0085386	no
Total Lead	83.016011	5.8755309	543.05682	26.565123	3.1140314	543.05682	3.1140314	4.0793811	9.6846376	0.0022046	0.0052339	no
Total Mercury	5.9131779	0.0743231	12.387187	1.8922169	0.0393913	12.387187	0.0393913	0.0516025	0.1225068	2.789E-05	6.621E-05	no
Total Nickel	1117.1218	225.33119	---	357.47898	119.42553	---	119.42553	156.44745	371.41341	0.0845492	0.2007237	no
Total Zinc	135.86327	225.32835	34894.946	43.476248	119.42402	34894.946	43.476248	56.953884	135.21113	0.0307797	0.0730724	no
Total Cyanide	50.477958	10.386358	1325.8585	16.152947	5.5047698	1325.8585	5.5047698	7.2112484	17.119834	0.0038972	0.0092521	no
DIOXIN												
2,3,7,8 TCDD; dioxin	---	---	1.418E-06	---	---	1.418E-06	1.418E-06	1.418E-06	3.375E-06	7.664E-10	1.824E-09	no
VOLATILE COMPOUNDS												
Benzene	2473.31	2247.0486	2.1971142	791.4592	1190.9358	2.1971142	2.1971142	2.1971142	5.2291318	0.0011874	0.002826	no
Bromoform	3222.2313	2926.1566	7.7897685	1031.114	1550.863	7.7897685	7.7897685	7.7897685	18.539649	0.0042098	0.0100194	no
Bromodichloromethane	---	---	0.3994753	---	---	0.3994753	0.3994753	0.3994753	0.9507512	0.0002159	0.0005138	no
Carbon Tetrachloride	3002.2838	2726.419	0.4394228	960.73081	1445.0021	0.4394228	0.4394228	0.4394228	1.0458264	0.0002375	0.0005652	no
Chloroform	3178.2418	2886.2091	10.586096	1017.0374	1529.6908	10.586096	10.586096	10.586096	25.194908	0.0057211	0.0136161	no
Dibromochloromethane	---	---	0.7789769	---	---	0.7789769	0.7789769	0.7789769	1.8539649	0.000421	0.0010019	no
1,2-Dichloroethane	12976.904	11784.522	0.7190556	4152.6094	6245.7965	0.7190556	0.7190556	0.7190556	1.7113522	0.0003886	0.0009249	no
1,1-Dichloroethylene	1275.6957	1158.4784	0.0998688	408.22262	613.99355	0.0998688	0.0998688	0.0998688	0.2376878	5.397E-05	0.0001285	no
1,3-Dichloropropylene	666.44102	605.20509	19.694133	213.26113	320.7587	19.694133	19.694133	19.694133	46.872036	0.0106433	0.0253311	no
Ethylbenzene	3519.1605	3195.8025	4773.7299	1126.1314	1693.7753	4773.7299	1126.1314	1475.2321	3502.2685	0.7972626	1.892738	no
Methyl Chloride	60485.571	54927.855	---	19355.383	29111.763	---	19355.383	25355.551	60195.24	13.702951	32.531434	no
Methylene Chloride	21224.937	19274.684	8.7884568	6791.9798	10215.582	8.7884568	8.7884568	8.7884568	20.916527	0.0047496	0.011304	no
1,1,2,2-Tetrachloro- ethane	1024.9555	930.77747	0.3195802	327.98576	493.31206	0.3195802	0.3195802	0.3195802	0.760601	0.0001727	0.0004111	no







APPENDIX A-2 LA0120677, AI No. 127497

Documentation and Explanation of Water Quality Screen  
and Associated Lotus Spreadsheet

Each reference column is marked by a set of parentheses enclosing a number and asterisk, for example (\*1) or (\*19). These columns represent inputs, existing data sets, calculation points, and results for determining Water Quality Based Limits for an effluent of concern. The following represents a summary of information used in calculating the water quality screen:

Receiving Water Characteristics:

Receiving Water: Tigre Coulee via local drainage; thence into Bayou Tigre  
Critical Flow, Qrc (cfs): 0.1 cfs  
Harmonic Mean Flow, Qrh (cfs): 0 cfs  
Segment No.: 060903  
Receiving Stream Hardness (mg/L): 82 mg/l  
Receiving Stream TSS (mg/L): 70 mg/l  
MZ Stream Factor, Fs: 1  
Plume distance, Pf: N/A

Effluent Characteristics:

Company: Magnolia Plantation Water System  
Facility flow, Qe (MGD): 0.0648 MGD  
Effluent Hardness: N/A  
Effluent TSS: N/A  
Pipe/canal width, Pw: N/A  
Permit Number: LA0120677

Variable Definition:

Qrc, critical flow of receiving stream, cfs  
Qrh, harmonic mean flow of the receiving stream, cfs  
Pf = Allowable plume distance in feet, specified in LAC 33.IX.1115.D  
Pw = Pipe width or canal width in feet  
Qe, total facility flow, MGD  
Fs, stream factor from LAC.IX.33.11 (1 for harmonic mean flow)  
Cu, ambient concentration, ug/L  
Cr, numerical criteria from LAC.IX.1113, Table 1  
WLA, wasteload allocation  
LTA, long term average calculations  
WQBL, effluent water quality based limit  
ZID, Zone of Initial Dilution in % effluent  
MZ, Mixing Zone in % effluent

Formulas used in aquatic life water quality screen (dilution type WLA):

Streams:

$$\text{Dilution Factor} = \frac{Q_e}{(Q_{rc} \times 0.6463 \times F_s + Q_e)}$$

$$\text{WLA a,c,h} = \frac{\text{Cr}}{\text{Dilution Factor}} - \frac{(\text{Fs} \times \text{Qrc} \times 0.6463 \times \text{Cu})}{\text{Qe}}$$

Static water bodies (in the absence of a site specific dilution):

Discharge from a pipe:

Discharge from a canal:

Critical  
 Dilution =  $\frac{(2.8) \text{ Pw } n^{1/2}}{\text{Pf}}$

Critical  
 Dilution =  $\frac{(2.38) (\text{Pw}^{1/2})}{(\text{Pf})^{1/2}}$

$$\text{WLA} = \frac{(\text{Cr}-\text{Cu}) \text{ Pf}}{(2.8) \text{ Pw } n^{1/2}}$$

$$\text{WLA} = \frac{(\text{Cr}-\text{Cu}) \text{ Pf}^{1/2}}{2.38 \text{ Pw}^{1/2}}$$

Formulas used in human health water quality screen, human health non-carcinogens (dilution type WLA):

Streams:

$$\text{Dilution Factor} = \frac{\text{Qe}}{(\text{Qrc} \times 0.6463 + \text{Qe})}$$

$$\text{WLA a,c,h} = \frac{\text{Cr}}{\text{Dilution Factor}} - \frac{(\text{Qrc} \times 0.6463 \times \text{Cu})}{\text{Qe}}$$

Formulas used in human health water quality screen, human health carcinogens (dilution type WLA):

$$\text{Dilution Factor} = \frac{\text{Qe}}{(\text{Qrh} \times 0.6463 + \text{Qe})}$$

$$\text{WLA a,c,h} = \frac{\text{Cr}}{\text{Dilution Factor}} - \frac{(\text{Qrh} \times 0.6463 \times \text{Cu})}{\text{Qe}}$$

Static water bodies in the absence of a site specific dilution (human health carcinogens and human health non-carcinogens):

Discharge from a pipe:

Discharge from a canal:

Critical  
 Dilution =  $\frac{(2.8) \text{ Pw } n^{1/2}}{\text{Pf}}$

Critical  
 Dilution =  $\frac{(2.38) (\text{Pw}^{1/2})}{(\text{Pf})^{1/2}}$

$$\text{WLA} = \frac{(\text{Cr}-\text{Cu}) \text{ Pf}^*}{(2.8) \text{ Pw } n^{1/2}}$$

$$\text{WLA} = \frac{(\text{Cr}-\text{Cu}) \text{ Pf}^{1/2*}}{2.38 \text{ Pw}^{1/2}}$$

\* Pf is set equal to the mixing zone distance specified in LAC 33:IX.1115 for the static water body type, i.e., lake, estuary, Gulf of Mexico, etc.

If a site specific dilution is used, WLA are calculated by subtracting Cu from Cr and dividing by the site specific dilution for human health and aquatic life criteria.

$$WLA = \frac{(Cr-Cu)}{\text{site specific dilution}}$$

Longterm Average Calculations:

$$LTAA = WLAa \times 0.32$$

$$LTAc = WLAc \times 0.53$$

$$LTAh = WLAh$$

WQBL Calculations:

Select most limiting LTA to calculate daily max and monthly avg WQBL

If aquatic life LTA is more limiting:

$$\text{Daily Maximum} = \text{Min}(LTAA, LTAc) \times 3.11$$

$$\text{Monthly Average} = \text{Min}(LTAc, LTAh) \times 1.31$$

If human health LTA is more limiting:

$$\text{Daily Maximum} = LTAh \times 2.38$$

$$\text{Monthly Average} = LTAh$$

Mass Balance Formulas:

$$\text{mass (lbs/day)}: (\text{ug/L}) \times 1/1000 \times (\text{flow, MGD}) \times 8.34 = \text{lbs/day}$$

$$\text{concentration(ug/L)}: \frac{\text{lbs/day}}{(\text{flow, MGD}) \times 8.34 \times 1/1000} = \text{ug/L}$$

The following is an explanation of the references in the spreadsheet.

- (\*1) Parameter being screened.
- (\*2) Instream concentration for the parameter being screened in ug/L. In the absence of accurate supporting data, the instream concentration is assumed to be zero (0).
- (\*3) Monthly average effluent or technology value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
- (\*4) Daily maximum technology value in concentration units of ug/L or mass units of lbs/day. Units determined on a case-by-case basis as appropriate to the particular situation.
- (\*5) Minimum analytical Quantification Levels (MQL's). Established in a letter dated January 27, 1994 from Wren Stenger of EPA Region 6 to Kilren Vidrine of LDEQ and from the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". The applicant must test for the parameter at a level at least as sensitive as the specified MQL. If this is not done, the MQL becomes the application value for screening purposes if the pollutant is suspected to be present

on-site and/or in the waste stream. Units are in ug/l or lbs/day depending on the units of the effluent data.

- (\*6) States whether effluent data is based on 95th percentile estimation. A "1" indicates that a 95th percentile approximation is being used, a "0" indicates that no 95th percentile approximation is being used.
- (\*7) 95th percentile approximation multiplier (2.13). The constant, 2.13, was established in memorandum of understanding dated October 8, 1991 from Jack Ferguson of Region 6 to Jesse Chang of LDEQ and included in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". This value is screened against effluent Water Quality Based Limits established in columns (\*18) - (\*21). Units are in ug/l or lbs/day depending on the units of the measured effluent data.
- (\*8) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, acute criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations.

Hardness Dependent Criteria:

<u>Metal</u>	<u>Formula</u>
Cadmium	$e^{(1.1280[\ln(\text{hardness})] - 1.6774)}$
Chromium III	$e^{(0.8190[\ln(\text{hardness})] + 3.6880)}$
Copper	$e^{(0.9422[\ln(\text{hardness})] - 1.3884)}$
Lead	$e^{(1.2730[\ln(\text{hardness})] - 1.4600)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})] + 3.3612)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})] + 0.8604)}$

Dissolved to Total Metal Multipliers for Freshwater Streams (TSS dependent):

<u>Metal</u>	<u>Multiplier</u>
Arsenic	$1 + 0.48 \times \text{TSS}^{-0.73} \times \text{TSS}$
Cadmium	$1 + 4.00 \times \text{TSS}^{-1.13} \times \text{TSS}$
Chromium III	$1 + 3.36 \times \text{TSS}^{-0.93} \times \text{TSS}$
Copper	$1 + 1.04 \times \text{TSS}^{-0.74} \times \text{TSS}$
Lead	$1 + 2.80 \times \text{TSS}^{-0.80} \times \text{TSS}$
Mercury	$1 + 2.90 \times \text{TSS}^{-1.14} \times \text{TSS}$
Nickel	$1 + 0.49 \times \text{TSS}^{-0.57} \times \text{TSS}$
Zinc	$1 + 1.25 \times \text{TSS}^{-0.70} \times \text{TSS}$

Dissolved to Total Metal Multipliers for Marine Environments (TSS dependent):

<u>Metal</u>	<u>Multiplier</u>
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Copper	$1 + (10^{4.86} \times \text{TSS}^{-0.72} \times \text{TSS}) \times 10^{-6}$
Lead	$1 + (10^{6.06} \times \text{TSS}^{-0.85} \times \text{TSS}) \times 10^{-6}$
Zinc	$1 + (10^{5.36} \times \text{TSS}^{-0.52} \times \text{TSS}) \times 10^{-6}$

If a metal does not have multiplier listed above, then the dissolved to total metal multiplier shall be 1.

- (\*9) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, freshwater (FW) or marine water (MW) (whichever is applicable) aquatic life protection, chronic criteria. Units are specified. Some metals are hardness dependent. The hardness of the receiving stream shall generally be used, however a flow weighted hardness may be determined in site-specific situations. Dissolved metals are converted to Total metals using partition coefficients in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Similar to hardness, the TSS of the receiving stream shall generally be used, however, a flow weighted TSS may be determined in site-specific situations.

Hardness dependent criteria:

<u>Metal</u>	<u>Formula</u>
Cadmium	$e^{(0.7852[\ln(\text{hardness})] - 3.4900)}$
Chromium III	$e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$
Copper	$e^{(0.8545[\ln(\text{hardness})] - 1.3860)}$
Lead	$e^{(1.2730[\ln(\text{hardness})] - 4.7050)}$
Nickel	$e^{(0.8460[\ln(\text{hardness})] + 1.1645)}$
Zinc	$e^{(0.8473[\ln(\text{hardness})] + 0.7614)}$

Dissolved to total metal multiplier formulas are the same as (\*8), acute numerical criteria for aquatic life protection.

- (\*10) LAC 33.IX.1113.C.6, Table 1, Numerical Criteria for Specific Toxic Substances, human health protection, drinking water supply (HHDW), non-drinking water supply criteria (HHNDW), or human health non-primary contact recreation (HHNPCR) (whichever is applicable). A DEQ and EPA approved Use Attainability Analysis is required before HHNPCR is used, e.g., Monte Sano Bayou. Units are specified.
- (\*11) C if screened and carcinogenic. If a parameter is being screened and is carcinogenic a "C" will appear in this column.
- (\*12) Wasteload Allocation for acute aquatic criteria (WLAA). Dilution type WLAA is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the acute aquatic numerical criteria for that parameter. Units are in ug/L.

Dilution WLAA formulas for streams:

$$\text{WLAA} = (\text{Cr}/\text{Dilution Factor}) - \frac{(\text{Fs} \times \text{Orc} \times 0.6463 \times \text{Cu})}{\text{Qe}}$$

Dilution WLAA formulas for static water bodies:

$$\text{WLAA} = (\text{Cr}-\text{Cu})/\text{Dilution Factor}$$

Cr represents aquatic acute numerical criteria from column (\*8).

If Cu data is unavailable or inadequate, assume Cu=0.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

- (\*13) Wasteload Allocation for chronic aquatic criteria (WLAc). Dilution type WLAc is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the chronic aquatic numerical criteria for that parameter. Units are in ug/L.

Dilution WLAc formula:

$$WLAc = (Cr/Dilution\ Factor) - \frac{(Fs \times Orc \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAc formulas for static water bodies:

$$WLAc = (Cr-Cu)/Dilution\ Factor)$$

Cr represents aquatic chronic numerical criteria from column (\*9).

If Cu data is unavailable or inadequate, assume Cu=0.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

- (\*14) Wasteload Allocation for human health criteria (WLAh). Dilution type WLAh is calculated in accordance with the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards". Negative values indicate that the receiving water is not meeting the human health numerical criteria for that parameter. Units are in ug/L. Dilution

WLAh formula:

$$WLAh = (Cr/Dilution\ Factor) - \frac{(Fs \times Orc,Orh \times 0.6463 \times Cu)}{Qe}$$

Dilution WLAh formulas for static water bodies:

$$WLAh = (Cr-Cu)/Dilution\ Factor)$$

Cr represents human health numerical criteria from column (\*10).

If Cu data is unavailable or inadequate, assume Cu=0.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

- (\*15) Long Term Average for aquatic numerical criteria (LTAA). WLAA numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.32. WLAA X 0.32 = LTAA.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

- (\*16) Long Term Average for chronic numerical criteria (LTAc). WLAc numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 0.53. WLAc X 0.53 = LTAc.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

- (\*17) Long Term Average for human health numerical criteria (LTAh). WLAh numbers are multiplied by a multiplier specified in the "Permitting Guidance Document for Implementing Louisiana Surface Water Quality Standards" which is 1. WLAc X 1 = LTAh.

If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then a blank shall appear in this column.

- (\*18) Limiting Acute, Chronic or Human Health LTA's. The most limiting LTA is placed in this column. Units are consistent with the WLA calculation. If standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then the type of limit, Aquatic or Human Health (HH), is indicated.
- (\*19) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 1.31 to determine the average WQBL ( $LTA_{\text{limiting aquatic}} \times 1.31 = WQBL_{\text{monthly average}}$ ). If human health criteria was the most limiting criteria then  $LTA_{\text{h}} = WQBL_{\text{monthly average}}$ . If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then either the human health criteria or the chronic aquatic life criteria shall appear in this column depending on which is more limiting.
- (\*20) End of pipe Water Quality Based Limit (WQBL) daily maximum in terms of concentration, ug/L. If aquatic life criteria was the most limiting LTA then the limiting LTA is multiplied by 3.11 to determine the daily maximum WQBL ( $LTA_{\text{limiting aquatic}} \times 3.11 = WQBL_{\text{daily max}}$ ). If human health criteria was the most limiting criteria then  $LTA_{\text{h}}$  is multiplied by 2.38 to determine the daily maximum WQBL ( $LTA_{\text{limiting aquatic}} \times 2.38 = WQBL_{\text{daily max}}$ ). If water quality standards are being applied at end-of-pipe, such as in the case of certain TMDL's, then either the human health criteria or the acute aquatic life criteria shall appear in this column depending on which is more limiting.
- (\*21) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of mass, lbs/day. The mass limit is determined by using the mass balance equations above.  $\text{Monthly average WQBL, ug/l/1000} \times \text{facility flow, MGD} \times 8.34 = \text{monthly average WQBL, lbs/day}$ .
- (\*22) End of pipe Water Quality Based Limit (WQBL) monthly average in terms of mass, lbs/day. Mass limit is determined by using the mass balance equations above.  $\text{Daily maximum WQBL, ug/l/1000} \times \text{facility flow, MGD} \times 8.34 = \text{daily maximum WQBL, lbs/day}$ .
- (\*23) Indicates whether the screened effluent value(s) need water quality based limits for the parameter of concern. A "yes" indicates that a water quality based limit is needed in the permit; a "no" indicates the reverse.